Cryptogam (Mosses, Fungi, Lichens) Inventory

Introduction

Cryptogams are ubiquitous within Shenandoah National Park (SHEN). They are found in countless habitats ranging from the splash zones of waterfalls, to the dry rock outcrops on the park's highest peaks. Some of the more commonly recognized groups of cryptogams include fungi, mosses, liverworts, hornworts, and slime molds. These groups are the foundation of ecosystem functioning and can be very sensitive to environmental changes and pollution. For example, the bryophytes (mosses, liverworts, and hornworts) and fungi (including lichens) are both known to be indicators of air pollutants and environmental change. Fungi also serve as food sources for invertebrate and vertebrate animals. Not only do these groups serve as habitat and food sources for invertebrate and vertebrate taxa, they also play a central role in nutrient cycling and nutrient availability, and can be used to detect environmental changes.

Lung lichen (Lobaria pulmonaria) from along the Limberlost trail in 2006. This lichen is known to be very sensitive to air polution and is used as an indicator of undisturbed ecosystems. Photo by Gary Fleming, VADCR.

Management Needs

The Shenandoah National Park Mission Goals state that, "The integrity of this portion of the Blue Ridge/Central Appalachian biome is protected, maintained, and restored as appropriate". Central to achieving this goal is an improved understanding of cryptogams through completion of inventories, and through monitoring of rare species and those that can indicate environmental changes.

Cryptogams represent a complex assemblage of fungal, protist, and plant groups that are often omitted from inventory work because of their small stature and complex taxonomy. Shenandoah's current vegetation monitoring program addresses only vascular plants, and does not include any formal monitoring of cryptogrammic species. Identification of cryptogam groups is so complex that it must be undertaken by teams of highly trained specialists. Park staff members do not possess the expertise to document most cryptogrammic taxa without assistance.

The need to better understand the Park's cryptogrammic flora became critical in 2007 when a volunteer lichenologist discovered rare lichens growing on the rock walls of Skyline Drive overlook turnouts scheduled to be demolished and re-built as part of overlook rehabilitation work. Time and money were not sufficient to complete survey work at all of the walls scheduled to be re-built, and for this reason, the park did not have the information needed to modify construction work at many sites. Greater knowledge is needed to ensure adequate protection of these resources now and in the future.

This fruticose rock beard lichen, Usnea halei, grows directly on rocks in many areas of the park. Photo by Nicholas Fisichelli, NPS.

Current Procedures

In recent years, cryptogam field survey work has focused on inventorying lichens. In 2005, as part of the Rock Outcrop Management Project, lichens were collected and identified from four high elevation rocky areas; Hawksbill Mountain, Crescent Rock, Old Rag Mountain, and Blackrock South. These sites were selected because they include each of three major rock types found in the park, greenstone (metabasalt), granite, and quartzite (siliciclastic). Park staff, Virginia Department of Conservation and Recreation scientists and several volunteers collected over 350 specimens of lichens from these sites. The specimens were then sorted and sent out to three expert lichenologists for identification.

In addition, an unaffiliated volunteer lichenologist has devoted six years (2005-2010) to documentation of lichens in the park. Her work has focused on lichens present on the rock walls and vegetation around overlooks and along Skyline Drive. To date over 1000 specimens have been collected and processed.

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Participants in a 2005 lichen collection field trip sponsored by the SHEN Rock Outcrop Management Project. Blackrock South, SNP.

The lichen Calvitimela talayana from Blackrock south. This lichen was discovered as part of the Rock Outcrop Management Project, and determined to be new to North America by expert lichenologist Dr. Erwin Brodo.

What We Have Learned

Field survey work for cryptogrammic taxa has periodically been done in the park by researchers or park staff. For this reason, park-specific species lists for certain cryptogrammic groups are available and include 330 bryophytes, 475 macrofungi, 22 slime molds, and over 500 lichens.

Lichen inventory work completed as part of the Rock Outcrop Management Project identified 96 species, two thirds of which were new to the park list. Seven of these species were new to Virginia, one species, Calvitimela talayana, was new to North America. Many of these lichens are typically found growing in more northern, boreal locations. Virginia is considerably disjunct from their normal range; however the unique high elevation outcrops in the park provide small pieces of suitable habitat with a more northern climate. In addition to these discoveries, two new natural community types dominated by lichens have been proposed for entry into the National Vegetation Classification System.

Lichen survey work along Skyline drive and rock walls has identified an additional 32 rare species. Two of these species had never been reported east of the Mississippi, six were new to Virginia, and two were boreal disjuncts. Lichen species diversity was very high on the undisturbed original rock walls build by the Civilian Conservation Corps. In one case, a single wall was found to support over 120 species of lichen.